
ROMCS0 Redirection to PC Card Socket A on the Élan™SC400 Microcontroller



Application Note

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The Élan™SC400 microcontroller supports a unique feature benefiting those involved with manufacturing, testing, and field upgrade of firmware on ÉlanSC400 microcontroller-based products. This feature is a pin-strap option that allows memory cycles that hit the region decoded by the boot ROM chip select (ROMCS0) logic to be redirected to PC Card Socket A.

Using the ROMCS0 redirection feature, products can be manufactured using Flash memory devices on which the system firmware has not yet been loaded. Using this technique allows the OEM to delay loading the firmware until after the product is built, thus allowing the very latest level of firmware to ship with the product.

The ROMCS0 redirection feature also allows a field service facility to test the end product simply by placing a linear memory (not AT Attach (ATA)) PC Card into Socket A (which contains product-specific diagnostics), setting a jumper, and pressing reset.

Perhaps one of the most compelling uses for the ROMCS0 redirection feature is to perform safe field upgrades of system firmware. On many systems, including user-friendly desktop systems, the boot ROM is soldered down. The system vendors often allow the end user to download BIOS updates over the internet, and then program the updates into the system Flash memory using a custom programming utility.

In most cases, the user is warned not to turn off the system power during the Flash memory programming process. Losing system power during this operation may result in having to remove the soldered Flash memory device, and reprogram it using an EPROM burner.

This is never a problem when using the ÉlanSC400 microcontroller's ROMCS0 redirection feature because the linear memory in the PC Card socket functions as the boot ROM when ROMCS0 is redirected there.

To use the ROMCS0 redirection feature, PC Card socket power must be maintained at all times while code or data fetches are being performed from it. On the ÉlanSC400 microcontroller, general purpose I/Os GPIO15–GPIO13 have a secondary, programmable function as PC Card socket power controls.

By default, GPIO15–GPIO13 are general purpose I/Os with their default termination set up so that the socket power for PC Card Socket A is turned on. This is done specifically to support the ROMCS0 redirection feature and is required because the PC Card socket power must be enabled at system reset for the initial opcode fetches from the linear memory PC Card to be performed.

During initialization, firmware typically programs the ÉlanSC400 microcontroller configuration, status, and control (CSC) registers very early in the process. If the PC Card controller is used, one of these initializations eventually sets CSC index 39h[5]. This bit controls the function muxing on three of the ÉlanSC400 microcontroller pins.

At reset, these pins default to GPIO15–GPIO13. Setting CSC index 39h[5] turns these pins into PC Card Socket A power controls. However, as soon as GPIO15–GPIO13 are transformed into PC Card socket power controls, the default GPIO termination is disabled, and the control of these pins comes from PCMCIA register (i.e., 3E0/3E1 space) index 02h[4]. Firmware that enables the PC Card socket power control function on these pins may thus inadvertently shut off the power to the PC Card socket from which it's running, which will result in a system malfunction.

To work around this situation, BIOS or other firmware initialization code that configures GPIO15–GPIO13 as PC Card socket power controls should first enable the PC Card controller via CSC index D0h[1], and then set 02h[4] in PC Card register space to enable the PC Card socket power via the PC Card controller registers. After this is done, CSC index 39h[5] may be set, thus enabling GPIO15–GPIO13 as PC Card socket power controls, without losing power to the PC Card socket.

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